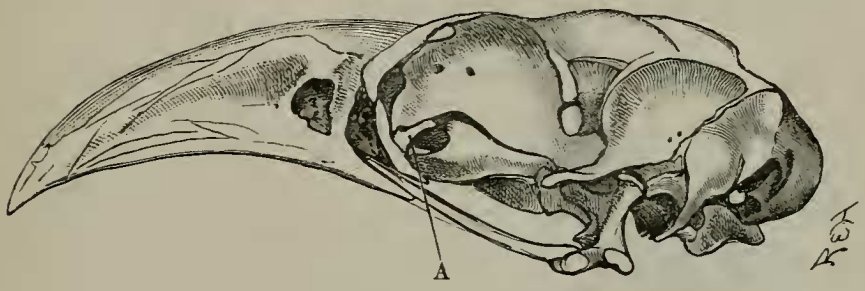
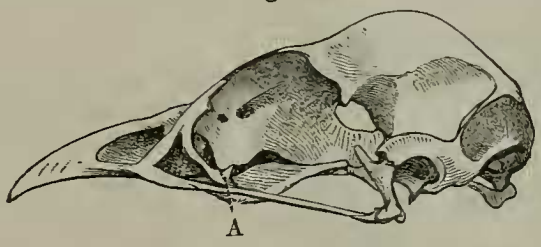
very minute. Contrary to what is found in many Cuckoos[1] the atlas is notched, not perforated, for the odontoid process; the notch,

Fig. 3.



Skull of *Scythrops*, lateral view.
A, os uncinatum.

Fig. 4.



Skull of *Eudynamis*, lateral view.
A, os uncinatum.

however, is very nearly converted into a perforation. Four ribs reach the sternum, the vertebra bearing the last complete rib being the last free dorsal.

2. On a Collection of Lepidoptera made by Mr. F. V. Kirby, chiefly in Portuguese East Africa. By Arthur G. Butler, Ph.D., F.L.S., F.Z.S., &c., Senior Assistant-Keeper, Zoological Department, British Museum.

[Received November 29, 1897.]

The collection of which the following is an account is chiefly of interest because of the care with which most of the specimens have been labelled, and from the fact that the supposed dry- and wet-season forms of some of the species were both secured. There are also several forms which are by no means common in collections, and an interesting extreme form of *Alæna nyassæ*, var. *ochracea*,

[1] *Rhinococcyx*, *Cuculus*, *Saurothera*. In *Eudynamis*, *Guira*, and *Diplopterus* there is a notch nearly converted into a foramen.

very deep in colouring, with the ochreous belt of the primaries united to a spot of this colour within the discoidal cell and that of the secondaries covering almost the entire basal two-thirds of these wings.

The following is a list of the species :—

RHOPALOCERA.

Nymphalidæ.

1. Amauris echeria Stoll.

Eastern Transvaal and Portuguese East Africa.

2. Amauris albimaculata Butl.

Eastern Transvaal.

3. Amauris ochlea Boisd.

Eastern Transvaal, and Shiringoma and Makaya districts, (Portuguese East Africa), November 1896.

4. Limnas chrysippus Linn.

Eastern Transvaal, Nyakongoli, Makoto, August 21st; Shiringoma and Makaya districts, November 1896 and January 1897.

5. Gnophodes diversa Butl.

Inure; Patawali, 27th August, 1897.

6. Melanites libya Dist.

Inure.

7. Melanitis solandra Fabr.

Inure; Mkanga Mivana, 10th September, 1896.

Both wet and dry forms were obtained; the specimens (dry-season) from Mkanga Mivana were terribly shattered, having probably been long on the wing.

8. Samanta perspicua Trim.

Inure.

Wet, intermediate, and dry forms were obtained, the last being my *S. simonsi* and thus proving the correctness of Mr. Marshall's supposition. In the intermediate form, however, the fulvous colouring of *S. simonsi* is only indicated on the ocelliferous area of the wings.

9. Mycalesis safitza Hewits.

Eastern Transvaal and Inure.

Wet, intermediate, and dry-season examples were obtained; *S. caffra* is represented by the intermediate form.

10. Physcænura pione Godm.

Inure.

11. Ypthima pupillaris Butl.

Inure (dry-season form).
The ocelli are reduced to points on the under surface.

12. Euralia wahlbergi Wallgr.

Makaya district, January and February 1896; Inure.
The specimens are a good deal worn.

13. Euralia kirbyi sp. n.

Nearest to *E. deceptor*, but in the character of the white markings reminding one of *Panopea delagoæ*, the belt crossing the median vein of primaries being narrower and barely visible above the second median branch; the subapical belt also decidedly narrower, so that the space between the two belts is of nearly double the width; the other white spots on these wings similarly placed to those in *E. deceptor*, but that towards the base of the cell much smaller; the belt across the secondaries narrower and whiter; the outer border consequently half as wide again as in *E. deceptor*, the subapical series of white spots very small or wanting, and the submarginal spots small and squamose; below the differences are similar, the costal area of secondaries being much browner. Expanse of wings 87 millimetres.

Shiringoma and Makaya districts, November 1896.

This is doubtless a representative form of *E. deceptor*, but differs quite as much in character as any of the other described species of its genus, excepting perhaps *E. usambara* of the *E. anthedon* group and *E. mechowi* of the *E. dinarcha* group.

14. Hypolimnas misippus Linn.

Shiringoma and Makaya districts, November 1896.

15. Charaxes varanes Cram.

Makaya district, January and February 1896.

16. Junonia actia Dist.

Chiperoni, Portuguese Central Africa, September 1896.

17. Junonia cuama Hewits.

Chiperoni, September 1896, and Inure.

18. Junonia elgiva Hewits.

Eastern Transvaal; Chiperoni, September 1896; Shiringoma and Makaya districts, November 1896; Inure.

19. Junonia artaxia Hewits.

Chiperoni, September and October; Shiringoma and Makaya districts, November 1896.

20. Junonia clelia Cram.

Eastern Transvaal, and Inure, Portuguese East Africa.

21. Junonia boopis Trim.

Nyakongoli, Makoto, August 21st; Chiperoni, September 1896.

22. Protogoniomorphia anacardii Linn.

Eastern Transvaal and Portuguese East Africa.

23. Protogoniomorpha aglatonice Godt.

Inure.
The vars. *aglatonice* and *nebulosa* were both obtained.

24. Pyrameis cardui Linn.

Eastern Transvaal.

25. Euryphura achlys Hopff.

♂. Chiperoni, Portuguese Central Africa, September 1896.

26. Euryphene senegalensis Hübn.

♀. Chiperoni, October 1896.

27. Aterica galene Brown.

Patawali, Portuguese East Africa, 27th August, 1897.
Only one much damaged male of this species was obtained.

28. Euphædra neophron Hopff.

Portuguese East Africa.
No exact locality is given on the envelope.

29. Crenidomimas concordia Hopff.

♀. Patawali district, Portuguese East Africa.

The single example obtained corresponds exactly with Hopffer's figure in the colouring of the upper surface, but the innermost row of black spots on the secondaries is absent (as is sometimes the case in the nearly allied *C. crawshayi*): on the under surface the colouring is a little deeper than in the figure: but, as I pointed out when comparing *C. crawshayi* with Hopffer's figures, the blue spots on the primaries (excepting at apex) are not connected with the blue outer border; on the other hand this border is not continuous on the primaries as represented in Hopffer's description and figure. In some of the characters which distinguish *C. crawshayi* from *C. concordia* the present specimen therefore seems to be intermediate, though the more varied and blue-tinted upper surface with the wider bifid whitish subapical bar give it a different aspect from any of the females of the Nyasa type; so that, until the separation of the spots from the border on the under surface has been proved to be variable, the two forms must still be kept apart.

30. Crenis boisduvali Wallgr.

Eastern Transvaal.
The example now received agrees most nearly with one which

we received from Zomba in 1895, and differs about as much as the other forms to which names have been given recently; but considering that the majority of them occur in Natal, there can be little doubt that they are either seasonal forms or sports of two or three variable species at most. We received typical *C. boisduvali* from Zomba in 1893.

31. Neptis agatha Cram.

Chirimani, Portuguese East Africa, August 31st in open forest; Inure; Chiperoni, Portuguese Central Africa, October 1896.

The variation in size of this species is extraordinary; the Chiperoni example has an expanse of 70 millimetres.

32. Atella phalantha Drury.

Eastern Transvaal and Portuguese East Africa.

Both the wet-season form (*A. columbina*) and the dry form (*A. phalantha*) were obtained.

33. Byblia acheloia Wallgr.

Eastern Transvaal; Inure; Chiperoni, September 1896.

The typical dry form and the wet-season *B. vulgaris* were both obtained.

34. Eurytela dryope Fabr.

♂. Inure.

35. Acræa cabira Hopff.

Inure.

The specimens all have the pattern of the variety *apecida*.

36. Acræa serena var. buxtoni Butl.

♂. Portuguese East Africa.

37. Acræa lycia Fabr.

Eastern Transvaal and Nyakongoli; Makoto, Portuguese East Africa, 21st August.

Only two examples without head or abdomen.

38. Acræa doubledayi Guér.

Eastern Transvaal; Chiperoni, October 1896; Nyakongoli, 21st August.

39. Acræa natalica Boisd.

Nyakongoli, 21st August.

40. Acræa acrita Hewits.

Eastern Transvaal; Nyakongoli, 21st August; Chirimani, 31st August; Chiperoni, September 1896; Patawali district in open bush country and plantations.

41. Acræa aglatonice Westw.

♀ ♀. Portuguese East Africa (exact locality not noted).

42. Acræa anemosa Hewits.

Nyakongoli, 21st August; Shiringoma and Makaya districts, November 1896.

Lycænidæ.

43. Alæna nyassæ var. ochracea Butl.

Inure.
A very interesting form of this variety.

44. Polyommatus bæticus Linn.

Inure; Chiperoni, September 1896.

45. Catochrysops osiris Hopff.

Eastern Transvaal and Portuguese East Africa.

46. Catochrysops patricia Trim.

♂. Chiperoni, October 1896.
A curious aberration with white-edged elongated blackish spots across the disc of the wings.

47. Tarucus plinius Fabr.

Inure.

48. Cacyreus lingeus Cram.

Patawali, in plantations.

49. Zeritis harpax Fabr.

Eastern Transvaal.

50. Crudaria leroma Wallgr.

Inure.

51. Myrina ficedula Trim.

Eastern Transvaal.

52. Virachola antalus Hopff.

Inure.

53. Iolaus philippus Fabr.

Eastern Transvaal and Inure.

54. Iolaus buxtoni Hewits.

♀. Chiperoni, September 1896.

55. Iolaus pallene Wallgr.

Chiperoni, September 1896.

56. Stugeta bowkeri Trim.

Inure.

PAPILIONIDÆ.

57. MYLOTHRIS AGATHINA Cram.

Eastern Transvaal, Nyakongoli, August 21st; Chirimani, August 31st.

58. NYCHITONA MEDUSA var. ALCESTA Cram.

Portuguese East Africa.
I believe this genus consists of one variable species, but the variations of the African and Mascarene examples are somewhat different from those of Asia and Australasia, so that there is some excuse for keeping them separate.

59. TERIAS BRIGITTA var. ZOE Hopff.

Eastern Transvaal.

60. TERIAS MARSHALLI Butl.

♀. Patawali, Portuguese East Africa.
A small example of the intermediate-season form.

61. TERIAS HAPALE var. ÆTHIOPICA Trim.

Patawali and Inure.

62. TERACOLUS REGINA Trim.

♂ ♀. Wet form, Makaya district, January and February 1896.
♀. Dry form, Shiringoma and Makaya districts, November 1896.
The female of the wet form (*T. anax*) is, though rubbed, a new variety to me, the usual white spots on the apical area of the primaries being replaced by spots of rosy violet.

63. TERACOLUS IONE Godt.

♀ ♀. Portuguese East Africa, Makaya district, January and February 1896.

64. TERACOLUS SIPYLUS Swinh.

♂ ♂. Portuguese East Africa (no exact locality noted).

65. TERACOLUS ITHONUS Butl.

♂. Nyakongoli, Makoto, August 21st; ♀. Patawali.
The male (var. *ignifer*) is too much injured to be fit for the collection; the female is a starved intermediate-season form.

66. TERACOLUS OMPHALE Godt.

Eastern Transvaal.

67. TERACOLUS MUTANS Butl.

♀. Portuguese East Africa (wet-season).

68. CATOPSILIA FLORELLA Fabr.

Nyakongoli, August 21st; Chiperoni, October; Shiringoma and Makaya districts, November 1896 and January 1897.

69. Belenois thysa Hopff.

Nyakongoli, August 21st.

70. Belenois severina Cram.

Eastern Transvaal; Portuguese East Africa, Patawali district.

The wet form (*B. infida*), the intermediate form, and the dry form (*B. severina*) are all represented.

71. Belenois mesentina var. lordaca Walk.

♀. Portuguese East Africa.

72. Belenois zochalia Boisd.

♀. Dry-season form, Chirimani, August 31st.

73. Leuceronia argia Fabr.

Shiringoma and Makaya districts, November 1896.

74. Papilio nyassæ Butl.

Makaya district, January and February 1896.

75. Papilio polistratus Grose-Smith.

♀. Makaya district, January or February 1896.

Differs from the illustration of the male in its greater size; the pale markings on the primaries, excepting at external angle, are much broader; the markings on the basi-abdominal half of the secondaries are also broader, but the crescentic markings above the tail are very indistinct.

76. Papilio corinneus Bertol.

Inure, Nyakongoli, August 21st; Shiringoma and Makaya districts, November 1896 and January 1897.

77. Papilio leonidas Fabr.

Makaya district, January and February 1897.

78. Papilio demoleus Linn.

Eastern Transvaal, Makaya district, January and February 1897.

79. Papilio erinus Gray.

Eastern Transvaal, Makaya district, January and February 1896.

80. Papilio merope var. dardanus Brown.

Makaya district, January and February 1896.

Hesperiidæ.

81. Tagiades flesus Fabr.

Patawali.

82. Eretis djælælæ Wallgr.

Portuguese East Africa (exact locality not noted).

83. Andronymus philander Hopff.[1]

Chiperoni, September 1896.

84. Baoris netopha Hewits.

Chiperoni, September 1896.

Corresponds nearly with Trimen's figure of *B. roncilgonis* above and with Karsch's colouring of *B. cojo* below. Two examples which we have from Fwambo, Tanganyika, have the under surface mostly bright ochreous and scarlet, but with the same markings exactly as in *B. roncilgonis*.

85. Rhopalocampta pisistratus Fabr.

Portuguese East Africa (no exact locality noted).

HETEROCERA.

Arctiidæ.

86. Deiopeia pulchella Linn.

Eastern Transvaal and Inure.

87. Aletis monteironis Druce.

♀. Portuguese East Africa.

88. Leptosoma leuconoe Hopff.

Inure.

[1] I take this opportunity of describing a beautiful new species of *Cyclopides* from Fwambo, Tanganyika, collected by Mr. A. Carson:—

Cyclopides carsoni sp. n.

Nearest to *C. perexcellens*, the wings slightly broader in proportion to their length; the upper surface of a somewhat deeper olive-brown, the fringe of the primaries ochreous at external angle; no ochreous spots in the discoidal cell; the spots on the disc larger, the three uppermost (bifid) spots much paler; the fringe of the secondaries varied with dark brown: on the under surface of the primaries there is a well-defined pale ochreous streak above the cell from base to middle of wing, but no ochreous spot within the cell; the three uppermost discal spots as above, but the lowest spot very small; the secondaries below are cream-coloured with slight silvery reflections; the veins and outer margin black, but not the abdominal margin; a costal streak to middle, a quadrate patch from costal to subcostal vein above the cell, two similar patches placed obliquely above each of the subcostal branches, a quadrifid band from second subcostal branch across the end of the cell almost to the submedian vein and a quinquefid submarginal band between the same veins, deep ochreous bordered with black; a squamose pale ochreous longitudinal submedian streak, broadly interrupted by blackish brown, from the extremities of the two transverse deep ochreous bands to the submedian vein. Expanse of wings 34 millimetres.

Three males in the British Museum collection.

AGARISTIDÆ.

89. XANTHOSPILOPTERYX SUPERBA Butl.

Shiringoma and Makaya districts, November 1896.

NOCTUIDÆ.

90. TÆNIOPYGA SYLVINA Stoll.

Chiperoni, September 1896.

HYPSIDÆ.

91. EGYBOLIA VAILLANTINA Stoll.

Inure.

GEOMETRIDÆ.

92. COMIBÆNA LEUCOSPILATA Walk.

Portuguese East Africa (exact locality not noted).

3. On the Vascular System of the Chiroptera. By N. H. ALCOCK, B.A., M.D., Assistant to the Professor of Institutes of Medicine, Trinity College, Dublin[1].

PART I.—Thoracic Vessels of *Pteropus medius*; with a Summary of the Literature of the Chiroptera.

[Received October 13, 1897.]

The anatomy of the Chiroptera has been the subject of many and interesting researches. Dobson[2], in addition to numerous

[1] Communicated by Prof. G. B. HOWES, F.R.S., F.Z.S.

[2] DOBSON, G. E.—'Catalogue of the Chiroptera in the British Museum,' 567 pp., 30 pls.; London, 1878 (contains many references, chiefly to systematic papers). 'Monograph of the Asiatic Chiroptera' (includes European forms); London, 1876. "Secondary Sexual Characters in the Chiroptera," Proc. Zool. Soc. 1873, pp. 241–252. "On the Structure of the Pharynx, Larynx, and Hyoid Bones in the Genus *Epomophorus*," *loc. cit.* 1881, pp. 685–693. "Monograph of the Group *Molossi*," *loc. cit.* 1876, pp. 701–735. "Structure of Feet, Claws, and Wing-membrane of *Mystacina tuberculata*," *loc. cit.* 1876, pp. 486–488. "Monograph of the Genus *Taphozous*," *loc. cit.* 1875, pp. 546–556. "On Peculiar Structures in the Feet of certain Mammals, which enable them to walk on smooth perpendicular surfaces," *loc. cit.* 1876, pp. 526–535, pl. lv. (*Vesperugo*, *Mystacina*, *Thyroptera*, *Hyrax*). "On the Phalanx missing from certain Digits in the Manus of Chiroptera," Journ. Anat. Phys. xvi. p. 200. "Osteology of *Triænops persicus*," Journ. Asiatic Soc. Bengal, xli. pp. 136–142, pl. vi. "Chiroptera in Genoa Civic Museum etc.," Ann. Mus. Genov. (2) ii. pp. 16–19. "Report on Accessions to our Knowledge of the Chiroptera etc. in 1878–1880," Rep. British Assoc. 1880, pp. 169–197. "Geographical Distribution of Chiroptera," *loc. cit.* 1878, pp. 158–167. "Chiroptera in Göttingen Museum," Bull. Soc. Zool. France, 1880, pp. 232–239. "*Pteropus rodericensis*," Phil. Trans. clxviii. p. 457. "Conspectus of Sub-orders, Families, and Genera of Chiroptera, arranged according to their natural affinities," Ann. N. H. (4) xvi. pp. 345–357, and additional remarks, *loc. cit.* (4) xviii. pp. 345–347.